

144 Faraday's Researches

necessarily present at the *anode* and *cathode*. The complexity is rendered still greater by the circumstance that two or more of these actions may occur simultaneously,, and also in variable proportions to each other. But it may in a great measure be resolved by attention to the principles already laid down (482).

513. When *aqueous* solutions of bodies are used, secondary results are exceedingly frequent. Even when the water is not present in large quantity, but is merely that of combination, still secondary results often ensue: for instance, it is very possible that in Sir Humphry Davy's decomposition of the hydrates of potassa and soda, a part of the potassium produced was the result of a secondary action. Hence, also, a frequent cause for the disappearance of the oxygen and hydrogen which would otherwise be evolved: and when hydrogen does *not* appear at the *cathode* in an *aqueous solution*, it perhaps always indicates that a secondary action has taken place there. No exception to this rule has as yet occurred to my observation.

514. Secondary actions are *not confined to aqueous solutions*, or cases where water is present. For instance, various chlorides acted upon, when fused (138), by platina electrodes, have the chlorine determined electrically to the *anode*. In many cases, as with the chlorides of lead, potassium, barium, etc., the chlorine acts on the platina and forms a compound with it, which dissolves; but when protochloride of tin is used, the chlorine at the *anode* does not act upon the platina, but upon the chloride already there, forming a perchloride which rises in vapour (525, 539). These are, therefore, instances of secondary actions of both kinds, produced in bodies containing no water.

515. The production of boron from fused borax (138, 153) is also a case of secondary action; for boracic acid is not decomposable by electricity (144), and it was the sodium evolved at the *cathode* which, re-acting on the boracic acid around it, took oxygen from it and set boron free in the experiments formerly described.

516. Secondary actions have already, in the hands of M. Becquerel, produced many interesting results in the formation of compounds; some of them new, others imitations of those occurring naturally.¹ It is probable they may

prove equally
interesting in an opposite direction, *i.e.* as
affording cases of
analytic decomposition. Much information
regarding the com-
position, and perhaps even the arrangement, of
the particles of
such bodies as the vegetable acids and alkalies,
and organic

¹ *Annales de Chimie*, **torn. xxxv. p. 113.**